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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/757,778	01/15/2004	Michael P.C. Watts	P80/MII-40-22-03	6151

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EXAMINER	
WOLLSCHLAGER, JEFFREY MICHAEL	
ART UNIT	**PAPER NUMBER**
1732	

DATE MAILED: 03/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/757,778	WATTS ET AL.
	Examiner	Art Unit
	Jeff Wollschlager	1732

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)[x] Responsive to communication(s) filed on *24 January 2006*.

2a)[ ] This action is **FINAL**. 2b)[x] This action is non-final.

3)[ ] Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)[x] Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)[ ] Claim(s) _____ is/are allowed.

6)[x] Claim(s) *1-17* is/are rejected.

7)[ ] Claim(s) _____ is/are objected to.

8)[ ] Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)[ ] The specification is objected to by the Examiner.

10)[x] The drawing(s) filed on *15 January 2004* is/are: a)[ ] accepted or b)[x] objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)[ ] The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)[ ] Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)[ ] All b)[ ] Some * c)[ ] None of:

1.[ ] Certified copies of the priority documents have been received.

2.[ ] Certified copies of the priority documents have been received in Application No. _____.

3.[ ] Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)[x] Notice of References Cited (PTO-892)

2)[ ] Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)[x] Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *31004;32805;10705*; 51705; 22505

4)[ ] Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5)[ ] Notice of Informal Patent Application (PTO-152)

6)[ ] Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of Species A, claims 1-17, in the reply filed on January 24, 2006 is acknowledged. Claims 18-24 have been cancelled.

Drawings

The drawings are objected to because they are difficult to comprehend, specifically Figures 7-10. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-17 are rejected under 35 U.S.C. 102(e) as being anticipated by Chou et al. (U.S. Patent Application Publication 2004/0036201; published February 26, 2004, with a provisional filing date of May 24, 2002).

Claim 1 is directed to a method to improve the flow rate of an imprinting material comprising collecting thermal radiation at a target, defining collected thermal energy, and transferring the collected thermal energy to the imprinting material by conduction.

Chou et al., as best depicted in Figure 7, teach an imprint lithography method comprising the steps of collecting thermal radiation, in the form of infrared radiation, at a target, defining the collected thermal energy in terms of the ability of the collected energy to heat, soften, or cure the material to be imprinted, and transferring the collected thermal energy by conduction to the material to be imprinted (paragraph [0038]).

By heating the imprint material, the method of Chou et al. improves the ability of the material to flow. There are two possible targets in the method taught by Chou et al. The first target is the combination of the mold (10) and the conductive layer (14) in

Figure 7. The second target is the combination of the substrate (20) and the conductive layer (23) in Figure 7.

As to claim 2, the viscosity of the imprinting material is reduced when it is heated. (paragraph [0038])

As to claim 3, the imprint materials taught by Chou et al. can be thermoplastic resins, heat curable materials, or radiation curable materials (paragraph [0024]). These materials have glass transition temperatures. Further, Chou et al. exemplify the use of PMMA being heated to 120 °C. (paragraph [0024]). The glass transition temperature of PMMA is 105 °C . Also, the materials to be imprinted are heated and softened by the infrared radiation (paragraph [0038]). It is inherent that softening a thermoplastic to any useful degree requires it to be heated above its glass transition temperature.

As to claim 4, the thermo-curable or photo-curable imprinting materials are cured in the method of Chou et al. (paragraphs [0024] and [0038]). This is cross-linking the imprinting material.

Regarding claim 5, Chou et al. teach that one of the conductive layers (14) or (23) may be omitted (paragraph [0033]). By omitting conductive layer (14), for example, in view of Figure 7, the thermal radiation is propagated through the imprinting material. Additionally, Chou et al. teach that it may be advantageous to make the mold (10) or the substrate (20), including the conductive layers, partially transparent to radiation (paragraph [0032]). If these materials were partially transparent to the thermal radiation, the thermal radiation would also propagate through the imprinting material.

As to claim 6, the imprinting material is positioned upon a substrate (Figure 7) and when the substrate is partially transparent as taught by Chou et al. (paragraph [0032]), the radiation propagates through the substrate.

As to claims 7 and 9, both the mold (10) and conductive layer (14) combination and the substrate (20) and conductive layer (23) combination are bodies that have first and second opposed sides that collect thermal radiation on a first side and transfer thermal radiation to a second side.

As to claim 10, Chou et al. teach positioning a mold having a plurality of protrusions and recesses proximate to the imprinting material with the imprinting material substantially filling the recesses, and impinging actinic energy, in the form of ultraviolet radiation, upon the imprinting material to polymerize it (Figure 1, Figure 7, paragraphs [0024] and [0038]).

Claim 11 is directed to a method to improve the flow rate of an imprinting material comprising impinging thermal radiation upon a target to collect thermal energy, defining the collected thermal energy with the imprinting material in superimposition with the target and conducting the collected thermal energy to the imprinting material to increase a temperature thereof.

Chou et al., as best depicted in Figure 7, teach an imprint lithography method comprising the steps of collecting thermal radiation, in the form of infrared radiation, at a target, defining the collected thermal energy in terms of the collected energy's ability to heat, soften, or cure the material to be imprinted, and transferring the collected thermal energy by conduction to the material to be imprinted (paragraph [0038]).

By heating the imprint material, the method of Chou et al. improves the flow ability of the material. There are two possible targets in the method of Chou et al. The first target is the combination of the mold (10) and the conductive layer (14) in Figure 7. The second target is the combination of the substrate (20) and the conductive layer (23) in Figure 7. The imprinting material is clearly in superimposition of the substrate (20) and conductive layer (23) combination target.

As to claim 12, Chou et al. teach positioning a mold having a plurality of protrusions and recesses proximate to the imprinting material with the imprinting material substantially filling the recesses, and impinging actinic energy, in the form of ultraviolet radiation, upon the imprinting material to polymerize it (Figure 1, Figure 7, paragraphs [0024] and [0038]).

As to claim 13, heating reduces the viscosity of the material.

As to claim 14, the imprint materials taught by Chou et al. can be thermoplastic resins, heat curable materials, or radiation curable materials (paragraph [0024]). These materials have glass transition temperatures. Further, Chou et al. exemplify the use of PMMA being heated to 120 °C. (paragraph [0024]). The glass transition temperature of PMMA is 105 °C . Also, the materials to be imprinted are heated and softened by the infrared radiation (paragraph [0038]). It is inherent that softening a thermoplastic to any useful degree requires it to be heated above its glass transition temperature.

As to claim 15, the thermo or photo curable imprinting materials are cured in the method of Chou et al. (paragraphs [0024] and [0038]). This is cross-linking the imprinting material.

As to claim 16, the imprinting material is positioned upon a surface of the substrate (20) and conductive layer (23) combination. This combination is a target.

Regarding claim 17, Chou et al. teach that one of the conductive layers (14) or (23) may be omitted (paragraph [0033]). By omitting conductive layer (14), for example, in view of Figure 7, the thermal radiation is propagated through the imprinting material. Additionally, Chou et al. teach that it may be advantageous to make the mold (10) or the substrate (20), including the conductive layers partially transparent to radiation (paragraph [0032]). If these materials were partially transparent to the thermal radiation, the thermal radiation would also propagate through the imprinting material.

Claims 1-9, 11, and 13-17 are rejected under 35 U.S.C. 102(e) as being anticipated by Shih et al. (U.S. Patent Application Publication 2003/0071016; published April 17, 2003, with a provisional filing date of October 11, 2001).

Claim 1 is directed to a method to improve the flow rate of an imprinting material comprising collecting thermal radiation at a target, defining collected thermal energy, and transferring the collected thermal energy to the imprinting material by conduction.

Shih et al. teach an imprint lithography method comprising collecting thermal radiation, in the form of infrared radiation at a target, defining the collected thermal energy in terms of the ability of the collected energy to heat or cure the material to be imprinted, and transferring the collected thermal energy by conduction to the material to be imprinted. (Example 3 and Example 11).

As to claim 2, heating the imprint material reduces its viscosity (Example 3).

As to claim 3, Shih et al. teach using polymers as the imprint material. Polymers have glass transition temperatures. These polymers are heated to their flow temperature. (Example 3 and Example 11). Inherently, heating a polymer to its flow temperature requires the temperature to be above its glass transition temperature.

As to claim 4, Shih et al. teach curing photo-curable or thermo-curable imprinting materials (paragraphs [0023] and [0030]). Curing is cross-linking the material.

As to claim 5, Shih et al. teach propagating the thermal radiation through the imprinting material (Example 3).

As to claim 6, Shih et al. position the imprinting material upon a substrate and propagate thermal radiation through the substrate (Example 11). It is noted that the silicon wafer substrate used by Shih et al. will have some transparency to infrared radiation.

As to claims 7 and 9, the substrate, a body, used in the method of Shih et al. has first and second opposed sides, and collects thermal radiation proximate to the first side and transfers the thermal radiation to the second side (Example 11). Additionally, the mold used in the method taught by Shih et al. is not fully transparent to infrared radiation through the full spectrum. In turn, the FEP mold used in Example 3 would also collect some thermal radiation on one side and transfer thermal radiation to the second side.

Claim 11 is directed to a method to improve the flow rate of an imprinting material comprising impinging thermal radiation upon a target to collect thermal energy, defining the collected thermal energy with the imprinting material in superimposition with

the target and conducting the collected thermal energy to the imprinting material to increase a temperature thereof.

Shih et al. teach an imprint lithography method comprising collecting thermal radiation, in the form of infrared radiation at a target, defining the collected thermal energy in terms of the ability of the collected energy to heat or cure the material to be imprinted, and transferring the collected thermal energy by conduction to the material to be imprinted. (Example 3 and Example 11). The imprinting material is in superimposition of the wafer substrate.

As to claim 13, heating the imprinting material reduces its viscosity.

As to claim 14, Shih et al. teach using polymers as the imprint material. Polymers have glass transition temperatures. These polymers are heated to their flow temperature. (Example 3 and Example 11). Inherently, heating a polymer to its flow temperature requires the temperature to be above its glass transition temperature.

As to claim 15, Shih et al. teach curing photo-curable or thermo-curable imprinting materials (paragraphs [0023] and [0030]). Curing is cross-linking the material.

As to claim 16, Shih et al. teach positioning the imprinting material upon a surface of the wafer substrate target (Example 3 and Example 11)

As to claim 17, Shih et al. teach propagating the impinging thermal radiation, in the form of infrared radiation, through the imprinting material (Example 3).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shih et al. (U.S. Patent Application Publication 2003/0071016; published April 17, 2003, with a provisional filing date of October 11, 2001).

As to claim 10, Shih et al. teach the method of claim 1 as discussed in the 102(e) rejection above and further teach positioning a mold having a plurality of protrusions and recesses proximate to the imprinting material with the imprinting material substantially filling the recesses, and further teach impinging actinic energy, in the form of ultraviolet radiation, upon the imprinting material to polymerize it. (paragraphs [0023], [0031], and Figure 2). Shih et al. do not explicitly teach using both thermal radiation and actinic energy as part of the same process. However, Shih et al. teach that both infrared and ultraviolet radiation are conventional means for curing flowable compositions (paragraph [0023]) and that using these means is dependent upon the materials being utilized (paragraph [0031]). Therefore it would have been *prima facie* obvious, based on the teaching of Shih et al., to one of ordinary skill in the art at the time of the claimed invention to use both conventional means, depending on the material to be imprinted and the materials being used for imprinting, because one of

ordinary skill would understand that infrared radiation and ultraviolet radiation serve similar purposes, but that they are not completely interchangeable in all applications.

As to claim 12, Shih et al. teach the method of claim 11 as discussed in the 102(e) rejection above and further teach positioning a mold having a plurality of protrusions and recesses proximate to the imprinting material with the imprinting material substantially filling the recesses, and further teach impinging actinic energy, in the form of ultraviolet radiation, upon the imprinting material to polymerize it. (paragraphs [0023], [0031], and Figure 2). Shih et al. do not explicitly teach using both thermal radiation and actinic energy as part of the same process. However, Shih et al. teach that both infrared and ultraviolet radiation are conventional means for curing flowable compositions (paragraph [0023]) and that using these means is dependent upon the materials being utilized (paragraph [0031]). Therefore it would have been *prima facie* obvious, based on the teaching of Shih et al., to one of ordinary skill in the art at the time of the claimed invention to use both conventional means, depending on the material to be imprinted and the materials being used for imprinting, because one of ordinary skill would understand that infrared radiation and ultraviolet radiation serve similar purposes, but that they are not completely interchangeable in all applications.

.Conclusion

All claims are rejected.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

EP 1460738 by Gimkiewicz et al., teach an imprint lithography method including a step of heating the imprint material to improve the flow rate of the material (abstract).

2005/0040513 by Salmon, particularly Figure 14.

2004/0029041 by Shih et al., teach an imprint lithography method utilizing a pulsing UV/infrared heating light (paragraph [0052]).

6,964,793 by Willson et al. teach an imprint lithography method.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeff Wollschlager whose telephone number is 571-272-8937. The examiner can normally be reached on Monday - Thursday 7:00 - 4:45, alternating Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Colaianni can be reached on 571-272-1196. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JW

Jeff Wollschlager
Examiner
Art Unit 1732

March 15, 2006

MICHAEL P. COLAIANNI
SUPERVISORY PATENT EXAMINER